OPERATING SUMMARY

1967

UNION

water system

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

Copyright Provisions and Restrictions on Copying:

This Ontario Ministry of the Environment work is protected by Crown copyright (unless otherwise indicated), which is held by the Queen's Printer for Ontario. It may be reproduced for non-commercial purposes if credit is given and Crown copyright is acknowledged.

It may not be reproduced, in all or in part, for any commercial purpose except under a licence from the Queen's Printer for Ontario.

For information on reproducing Government of Ontario works, please contact ServiceOntario Publications at copyright@ontario.ca

ONTARIO WATER RESOURCES COMMISSION
801 BAY STREET, TORONTO 5
OFFICE OF THE GENERAL MANAGER

Members of the Union Local Advisory Committee.

Gentlemen:

We are happy to present you with the 1967 Operating Summary for the Union Water Treatment Plant, OWRC Project No. 6-0012-57.

Your co-operation with our staff throughout the year has been appreciated.

Yours very truly,

D. S. Caverly,
General Manager.

LIBRARY COPY
JAN 10 1969
ONTARIO WATER
RESOURCES COMMISSION

ONTARIO WATER RESOURCES COMMISSION
801 BAY STREET
TORONTO 5

J. A. VANCE, LL.D.
CHAIRMAN
J. H. H. ROOT, M.P.P.
VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER
W. S. MacDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am pleased to submit to you the 1967 Operating Summary for the Union Water Treatment Plant, OWRC Project No. 6-0012-57.

The summary reviews progress during the year, outlines operating problems encountered and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

DMcTavish

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

● This operating summary has been prepared in order to acquaint readers with the management of the project during 1967. The efficiency of the plant's operation is reflected in a general review. Significant financial details are recorded, and technical performance is illustrated by graphs and charts.

The summary should answer two salient questions. Are the project's facilities adequate at this time? And can the project meet future requirements?

The Regional Operations Engineer is primarily responsible for the preparation of the report, and will be pleased to answer any questions regarding it.

Most of the material for the graphs and charts was compiled by the statistics section of the Division of Plant Operations, with the final versions of the graphs being drawn by the draughting section of the Division of Sanitary Engineering. Cost data were provided by the Division of Finance.

It will be evident from the report that all of these groups co-operated with substantial success.

CONTENTS

Foreword 1
Title Page 3
'67 Review 5
Project Costs 6
Operating Costs 9
Process Data 14
Conclusions . . . . Inside back cover

UNION

water system

operated for the

TOWN OF LEAMINGTON
TOWN OF ESSEX
TOWNSHIP OF GOSFIELD NORTH
TOWNSHIP OF GOSFIELD SOUTH
TOWNSHIP OF MAIDSTONE
TOWNSHIP OF MERSEA
H. J. HEINZ COMPANY OF CANADA LIMITED

by the

ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN: Dr. James A. Vance

VICE-CHAIRMAN: J. H. H. Root, M. P. P.

COMMISSIONERS

W. D. Conklin, Q. C.
H. E. Brown
D. A. Moodie
L. E. Venchiarutti

GENERAL MANAGER: D. S. Caverly

ASSISTANT GENERAL MANAGERS

L. E. Owers
K. H. Sharpe
F. A. Voege
A. K. Watt

COMMISSION SECRETARY

W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

DIRECTOR: D. A. McTavish

Assistant Director: **C. W. Perry**
Regional Supervisor: **P. J. Osmond**
Operations Engineer: **R. E. Brown**

801 Bay Street Toronto 5

'67 REVIEW

The total system operating cost of $131,371.99 was higher than in 1966 by $5,909.95 or 4.7%. The production cost of water over the past seven years has been 7.3, 7.7, 8.2, 9.2, 8.1, 9.4 and 8.5 cents per 1000 gallons, the increased unit cost in 1967 being due mainly to increased operating costs.

OUTPUT AND CONSUMPTION

The total output of the Union Water System in 1967 increased by 5.5% from the 1966 water production. Consumption by participant was generally up except for the Township of Gosfield North, which experienced a decrease of 5.69%. Maximum demands on the plant occurred during mid June and late August and were again critical for periods of two to ten days.

TURBIDITY

Raw water turbidities again held steady, and better than 99% removal was experienced. Chlorine demands were down slightly indicating a slight improvement in the quality of the raw water.

PROJECT COSTS

NET CAPITAL COST (Estimated) $3,841,802.00

Note: The participants' share of net capital cost varies each year on the basis of consumption.

DEBT RETIREMENT BALANCE AT CREDIT
(Sinking Fund) December 31, 1967

Essex	$ 57,489.08
Leamington	94,630.22
H. J. Heinz	126,879.49
Gosfield North	8,643.70
Gosfield South	16,401.93
Mersea	31,473.77
Maidstone	9,074.18
TOTAL	$ 344,592.37

The total cost to the municipality during 1967 was as follows:

NET OPERATING

Essex	$ 17,651.97	
Leamington	36,070.79	
H. J. Heinz	49,546.79	
Gosfield North	2,801.54	
Gosfield South	8,881.82	
Mersea	14,310.90	
Maidstone	2,108.18	
		$131,371.99

DEBT RETIREMENT

Essex	$ 12,436.86	
Leamington	19,863.49	
H. J. Heinz	28,379.08	
Gosfield North	2,274.95	
Gosfield South	4,137.66	
Mersea	8,183.63	
Maidstone	2,251.33	
		$ 77,527.00

RESERVE

Essex	$ 4,229.91	
Leamington	6,875.12	
H. J. Heinz	9,443.86	
Gosfield North	666.71	
Gosfield South	1,667.62	
Mersea	2,859.61	
Maidstone	725.17	
		$ 26,468.00

INTEREST CHARGED

Essex	$ 36,069.26	
Leamington	55,131.62	
H. J. Heinz	75.731.37	
Gosfield North	5,706.10	
Gosfield South	13,378.32	
Mersea	23,538.09	
Maidstone	7,097.52	
		$216,652.28
TOTAL COST		$452,019.27

Summary of Participants' Share in 1967 Charges

Essex	$ 70,388.00
Leamington	117,941.02
H. J. Heinz	163,101.10
Gosfield North	11,449.30
Gosfield South	28,065.42
Mersea	48,892.23
Maidstone	12,182.20
	$452,019.27

OPERATING COSTS

Union Common	$130,349.36
Union East	85.90
Union West	936.73
Total System Cost	$131,371.99

MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY
JAN	6436.49	4385.41		1447.48		336.80	72.45	23.78	170.57
FEB	7450.63	4153.40	466.72	1689.96	609.95	240.33		80.24	210.03
MARCH	10511.17	6728.18	432.14	1735.21		539.94	126.35	299.46	649.89
APRIL	10050.50	4776.54	401.36	1805.98	618.31	92.16		1603.62	752.53
MAY	7488.96	5242.56	375.71	(262.15)	1306.18	296.06	19.80	149.92	360.88
JUNE	10020.51	4803.28	264.56	1785.35	1498.13	593.12		720.19	355.88
JULY	11064.44	4762.81	99.15	4098.73	1342.79	470.13		60.64	230.19
AUG	22877.44	4855.30	58.12	2451.70	2258.48	412.39		1037.95	11803.50
SEPT	10753.09	7135.76	12.96	2447.84	178.20	146.12		629.66	202.55
OCT	8587.93	5011.85	13.65	261.25	2534.45	255.29		210.72	300.72
NOV	14048.92	5026.68	97.18	4759.49	1266.16	205.96			2693.45
DEC	11059.28	5021.09	764.34	1785.12	1875.93	596.65	203.95	505.07	307.13
* TOTAL	130349.36	61902.86	2985.89	24005.96	13488.58	4184.95	422.55	5321.25	18037.32
UNION EAST	85.90			166.75				(80.85)	
UNION WEST	936.73			737.15					199.58

BRACKETS INDICATE CREDIT

* UNION COMMON

TOTAL SYSTEM OPERATING COST : $ 131,371.99

TOTAL PLANT OUTPUT

(BASED ON PLANT METER)

Month	Total Flow (MG)	Maximum Day Flow (MG)	Minimum Day Flow (MG)	Avg. Daily Flow (MG)	Cumulative Total (MG)
January	81.036	4.371	1.492	2.614	81.036
February	80.763	4.140	1.714	2.884	161.799
March	88.164	3.670	1.507	2.844	249.963
April	92.442	4.340	1.673	3.081	342.405
May	123.958	6.305	1.331	3.999	466.363
June	171.302	8.409	2.463	5.710	637.665
July	167.335	8.120	3.064	5.398	805.000
August	196.244	8.060	3.005	6.298	1001.244
September	188.361	8.375	3.493	6.279	1189.605
October	137.161	5.915	2.246	4.425	1326.766
November	108.005	5.399	1.840	3.600	1434.771
December	99.465	4.223	1.772	3.209	1534.236
Total	1534.236	-	-	-	-
Average	127.853	5.944	-	4.200	-

COMMENTS

During 1967, a total of 1534.236 million gallons of water were treated and pumped from the plant as measured by meter No. 1. It should be noted that this reading is slightly more than the cumulative readings of the area meters. The difference is 1.8% and is attributed mainly to meter discrepancies and line losses.

The total plant output for 1967 is up approximately 5.5% from 1966. The average daily flow of 4.200 million gallons represents 55.3% of plant design capacity (7.6 MGD). The average maximum daily flow of 5.944 million gallons represents 78.2% of plant design capacity.

CONSUMPTION OF PARTICIPANTS

PARTICIPANT	CONSUMPTION (MG)									% OF TOTAL								
	1960	1961	1962	1963	1964	1965	1966	1967	1968	1960	1961	1962	1963	1964	1965	1966	1967	1968
GOSFIELD S.	16.34	37.29	61.74	74.96	75.01	99.12	87.37	102.66		1.6	2.0	3.9	5.4	5.5	6.4	6.9	6.81	
GOSFIELD N.	9.95	13.13	21.60	29.53	23.35	30.06	32.93	31.06		0.9	1.1	1.6	2.1	1.7	1.9	2.2	2.06	
MERSEA	55.70	79.85	99.51	137.71	127.96	168.68	158.53	165.23		5.3	6.5	7.4	9.8	9.4	11.0	10.7	10.97	
LEAMINGTON	335.00	399.91	404.41	455.70	407.97	449.64	416.38	416.57		31.8	32.5	30.5	32.5	30.0	29.2	28.0	27.65	
HEINZ	500.00	534.50	557.04	520.40	541.00	595.00	594.00	572.23		47.5	43.5	41.8	37.1	39.8	38.8	40.0	37.98	
ESSEX	130.00	158.58	190.04	177.07	174.46	177.72	179.12	195.49		12.4	12.9	14.3	12.6	12.8	11.5	12.0	12.96	
MAIDSTONE	5.41	6.37	8.45	7.46	9.52	18.03	18.19	23.42		0.5	0.5	0.6	0.5	0.8	1.2	1.2	1.55	
TOTAL	1052.40	1229.63	1332.42	1402.83	1359.37	1538.25	1486.51	1506.65		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

COMMENTS

Consumptions of the Townships of Gosfield S., Gosfield N., Mersea and Maidstone have better than trebled since 1960, while the consumption of Essex, Leamington and Heinz has increased at the most by about a third. Each participants share of the total consumption has remained in its same relative position since 1960, with Heinz being the largest user at approximately 38% and Maidstone the smallest at about 1.5% of the total consumption.

PARTICIPANT	AGREED ANNUAL MINIMUMS * ORIGINAL	** REVISED	ANNUAL CONSUMPTIONS 1960	1961	1962	1963	1964	1965	1966	1967	1968	AGREED DAILY MAXIMUMS	1967 MONTHLY RATE CALCULATED DAILY
	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	1000 GALS.	1000 GALS.
H.J. HEINZ	520.0	520.0	500.0	534.5	557.0	520.4	541.0	595.0	594.[illegible]	572.2		3500	2070
LEAMINGTON	425.0	400.0	335.0	390.9	404.0	435.7	408.0	449.6	416.4	416.6		2100	1750
ESSEX	150.0	160.0	130.0	158.8	190.6	177.1	174.5	177.7	179.1	195.5		752	805
MERSEA	12.5	70.0	55.7	79.8	99.5	137.7	126.0	168.7	158.5	165.2		40	920
GOSFIELD S	16.5	40.0	16.3	37.3	51.8	74.9	75.0	99.1	87.4	102.7		60	695
GOSFIELD N	23.5	20.0	10.0	13.1	21.6	23.5	23.3	30.1	32.0	31.1		80	163
MAIDSTONE	12.0	10.0	5.4	6.4	9.5	7.5	9.6	13.1	1[illegible].[illegible]	23.4		45	88
TOTAL	1176.5	1220.0	1052.4	1220.8	1332.4	1402.8	1359.4	1533.2	14[illegible].5	1506.6		6577	5310

* AS PER ORIGINAL AGREEMENT
** REVISED EFFECTIVE JANUARY 1, 1963

COMMENTS

The tabulation above shows the evolution of both agreed minimum and maximum flow requirements of each participant since the system was put into operation. It is especially significant to note that in 1967 the Townships of Mersea, Gosfield South and Maidstone used more than twice their guaranteed minimums and that Mersea and Gosfield South consumed on an average daily basis water many times in excess of their agreed daily maximum.

UNION WATER SYSTEM

1967 FLOW DATA

ADJUSTED MONTHLY FLOWS BY PARTICIPANT

Flows expressed in Million Gallons (MG)

Month	Gosfield South	Mersea	Leamington	Essex	Maidstone	Gosfield North	Heinz	Total
January	3.187	7.970	25.502	12.154	1.665	1.960	35.456	87.900
February	3.304	8.263	26.436	12.600	1.727	2.038	32.992	87.360
March	5.396	10.813	27.214	13.114	1.600	2.878	32.477	93.487
April	5.228	10.477	26.368	12.706	1.550	2.783	39.438	98.550
May	12.771	16.987	30.577	10.787	1.625	1.618	48.094	122.459
June	20.837	27.715	49.889	17.599	2.652	2.640	47.710	169.042
July	11.355	19.752	47.585	21.949	1.875	2.161	51.621	156.298
August	12.939	22.508	54.222	25.011	2.137	2.463	64.226	183.506
September	12.141	16.284	53.248	23.697	2.381	4.908	60.676	173.335
October	7.064	9.473	30.978	13.787	1.385	2.855	60.774	126.316
November	4.338	7.704	22.899	16.490	2.479	2.443	52.207	108.560
December	4.101	7.285	21.652	15.592	2.344	2.310	46.557	99.841
Totals 1967	102.661	165.231	416.570	195.486	23.420	31.058	572.228	1506.654
Totals 1966	87.369	158.530	416.379	179.117	18.186	32.932	594.000	1486.513
% Diff. 67/66	+17.50%	+4.23%	+0.05%	+9.14%	+28.78%	-5.69%	-3.66%	+1.35%

COMMENTS

The chart of Adjusted Flows is merely a monthly representation of the bimonthly flow determinations as per meter readings taken by participants and the plant staff. The difference between 1967 and 1966 consumption by participant is shown on the last line.

Process Data

PLANT FLOW

Graph No. 1 shows the peak monthly flow slightly higher than in 1966 and the total annual flow up slightly. The peak month occurred in August when 183.5 million gallons were pumped. This represents an average daily flow of 5.91 MG which is 77.9% of the plant capacity.

H. J. HEINZ

Graph No. 2 shows that the total annual flow decreased even though the annual peak was up markedly from 1966. The peak occurred in August coincident with the plant peak.

LEAMINGTON

Graph No. 3 indicates a slight increase in total annual flow, and a reduction in the monthly peak flow. The peak occurred in August coincident with the plant peak.

ESSEX

Graph No. 4 shows that the annual flow has increased significantly. The monthly peak however decreased slightly and occurred in August coincident with the plant peak.

MERSEA

Graph No. 5 indicates that the monthly peak in 1967 was up considerably from 1966 and again occurred in June. The total annual flow also increased slightly.

GOSFIELD SOUTH

Graph No. 6 shows a considerable increase in both monthly peak and total annual flow. The peak again occurred in June and was off the plant peak.

GOSFIELD NORTH

Graph No. 7 shows a decrease in both peak monthly flow and total annual flow. The peak occurred in September and was off the plant peak.

MAIDSTONE

Graph No. 8 shows an increase in both peak monthly flow and total annual flow. The peak occurred in June.

PEAK DEMAND AS A PERCENTAGE OF DESIGN CAPACITY

Graph No. 9 shows that in 1967, the peak demands on the plant were critical for periods of from two to ten days. The 1967 periods of critical flow were as follows:

1 day	- June 13th	88% of capacity
2 days	- June 13th to 14th	96% of capacity
3 days	- June 13th to 15th	99% of capacity
4 days	- June 13th to 16th	100% of capacity
5 days	- June 12th to 16th	99% of capacity
6 days	- August 21st to 26th	95% of capacity
10 days	- August 16th to 25th	91% of capacity

In addition to the above, the highest rates for the 4, 6 and 12 hour periods occurred on June 13th, which was also the day of highest plant output.

PROBABILITY OF DAILY FLOWS

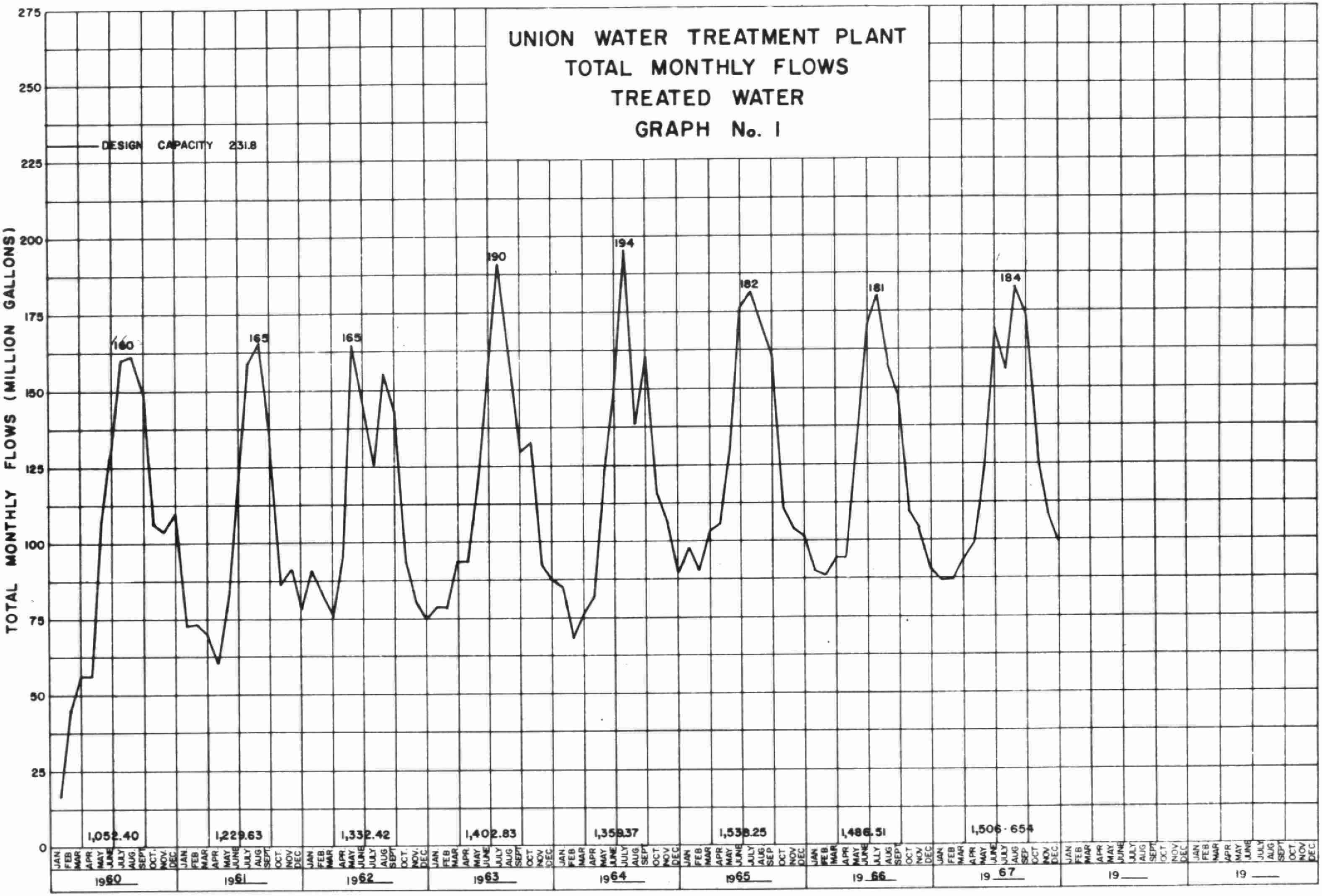
Graph No. 10 shows that in 1967, the treated water flows exceeded the design capacity of 7.6 MGD more than 7.5 percent of the time as compared to 3.2% of the time in 1966 and 5.2% of the time in 1965.

SEASONAL TURBIDITY VARIATION

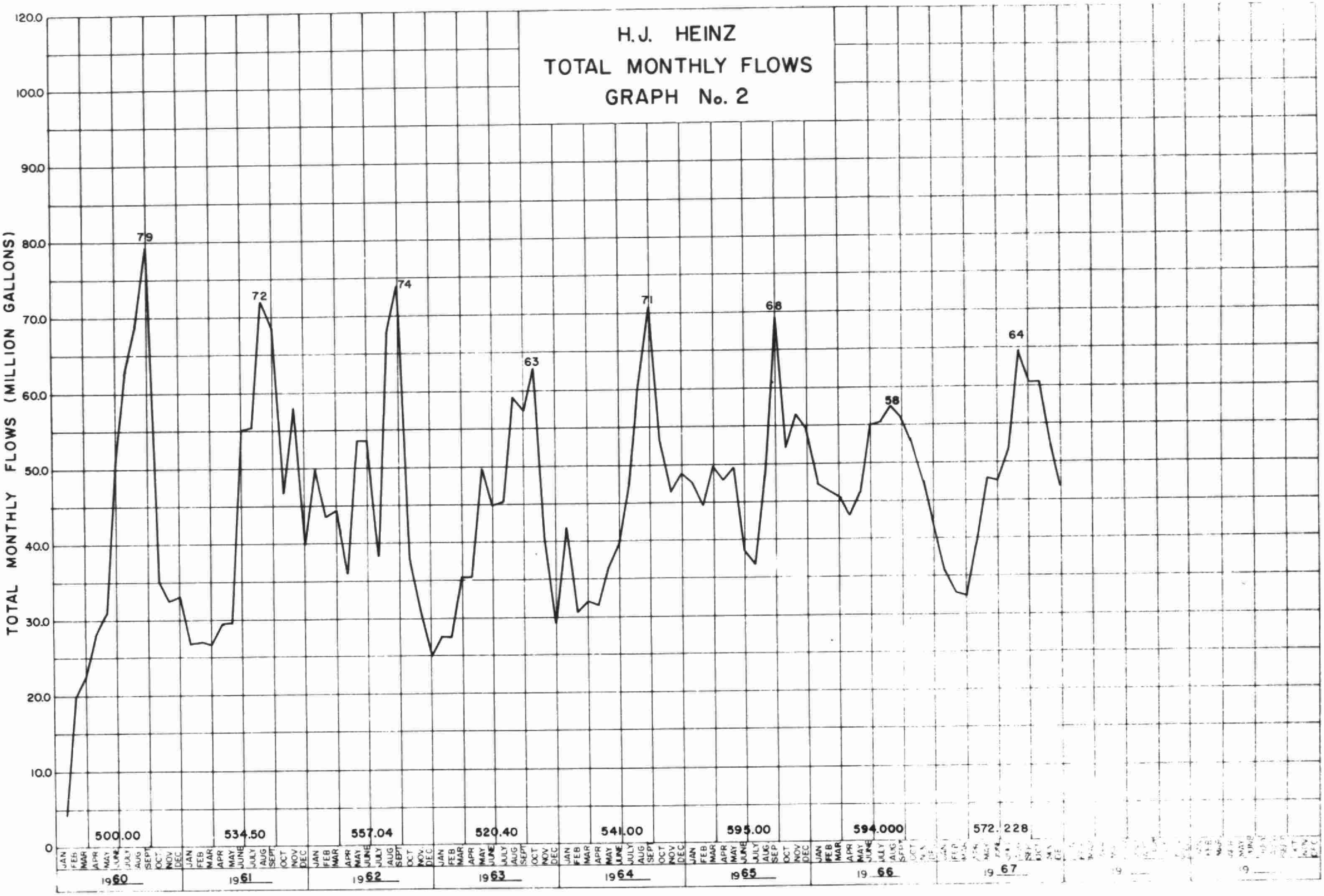
Graph No. 11, plotting seasonal turbidity variation, shows that the 1967 peak was again extreme. The turbidity in the clarified and filtered water remained at very satisfactory levels, with the overall removal efficiency holding at better than 99%.

The following table shows average turbidity variations for raw, clarified and filtered water over the past four years:

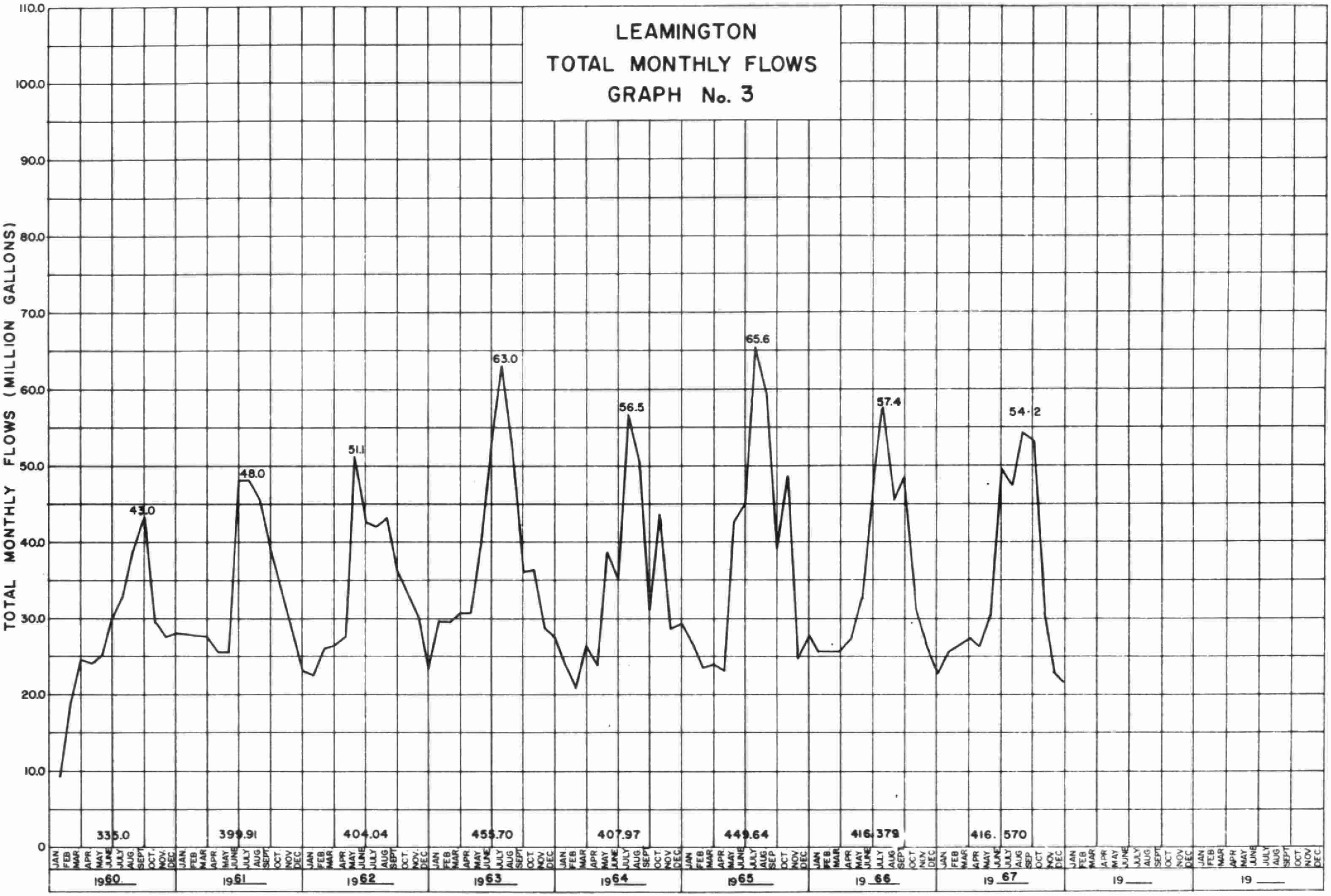
Year	Raw Water	Clarified Water	Filtered Water
1964	16.9	1.3	0.2
1965	17.1	3.2	0.2
1966	18.3	1.9	0.3
1967	19.0	1.7	0.2



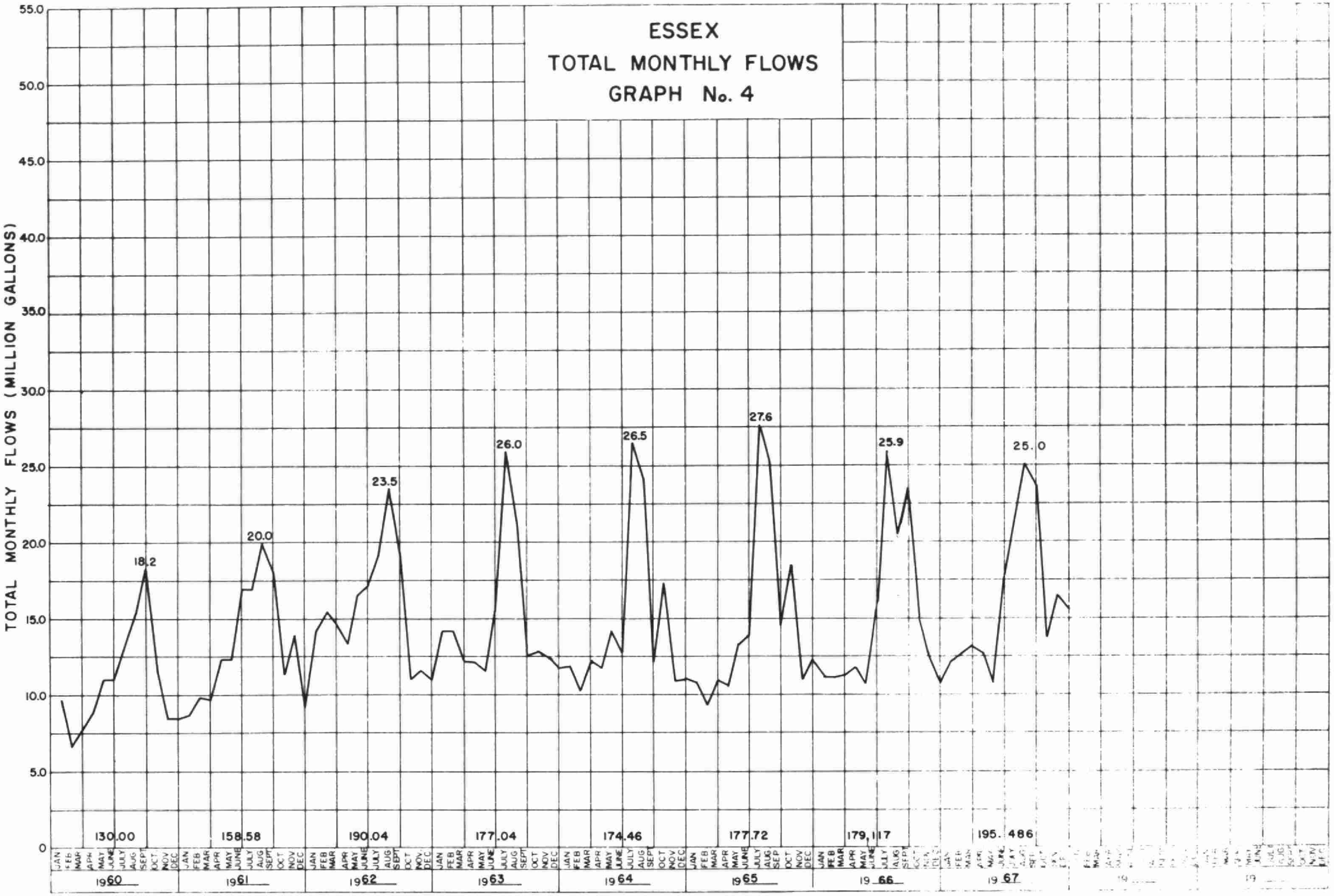
UNION WATER TREATMENT PLANT
TOTAL MONTHLY FLOWS
TREATED WATER
GRAPH No. 1



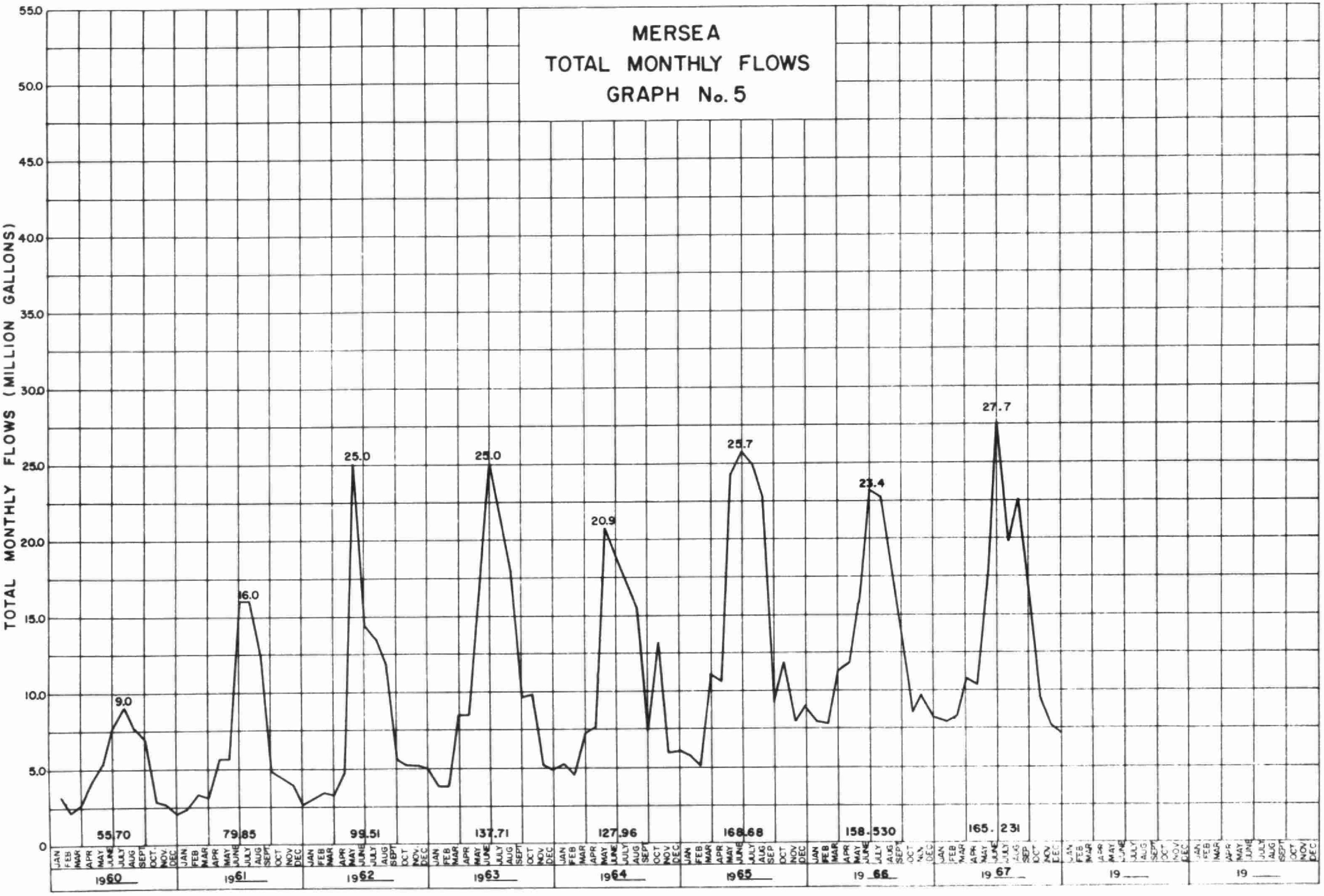
H.J. HEINZ
TOTAL MONTHLY FLOWS
GRAPH No. 2

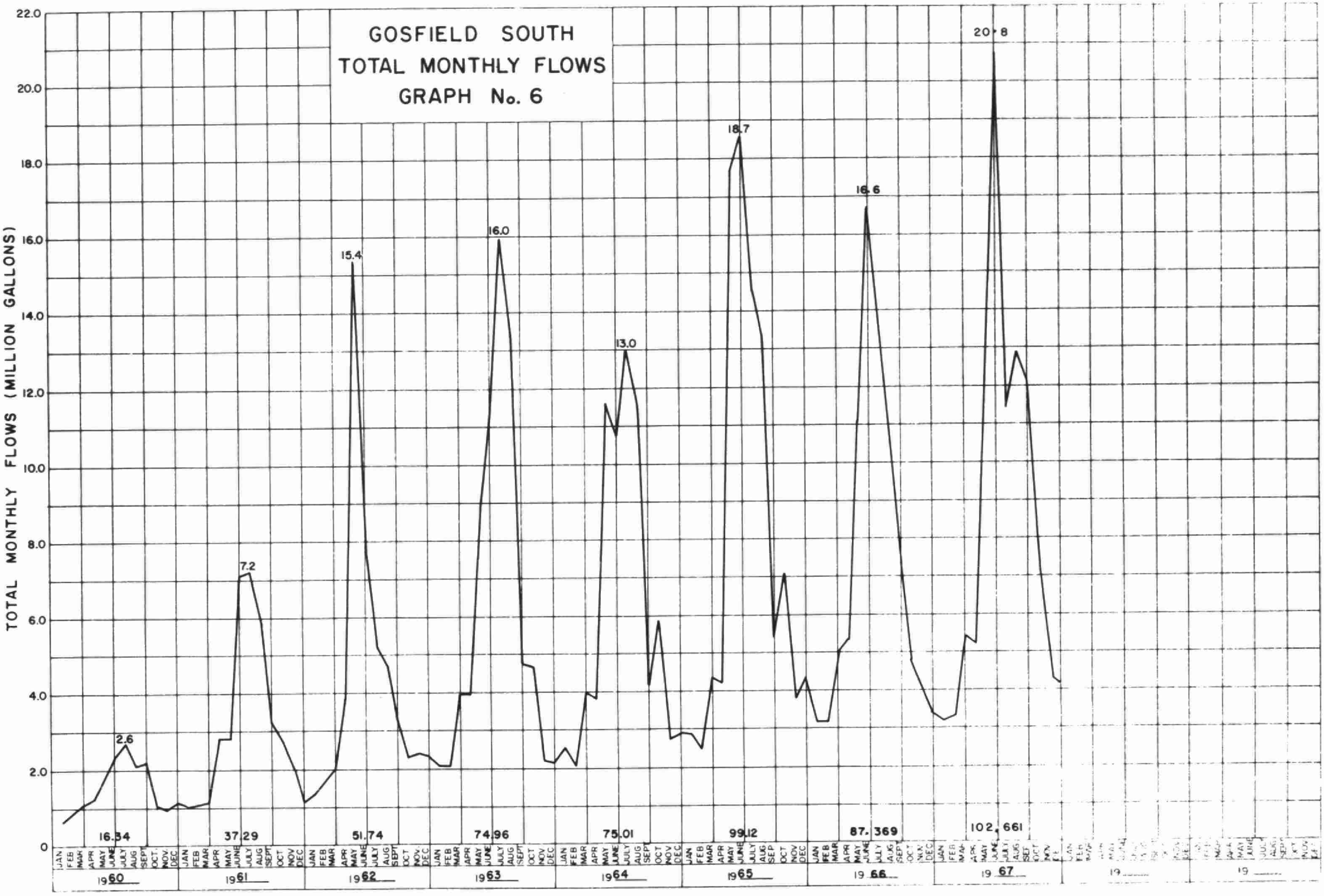


LEAMINGTON
TOTAL MONTHLY FLOWS
GRAPH No. 3

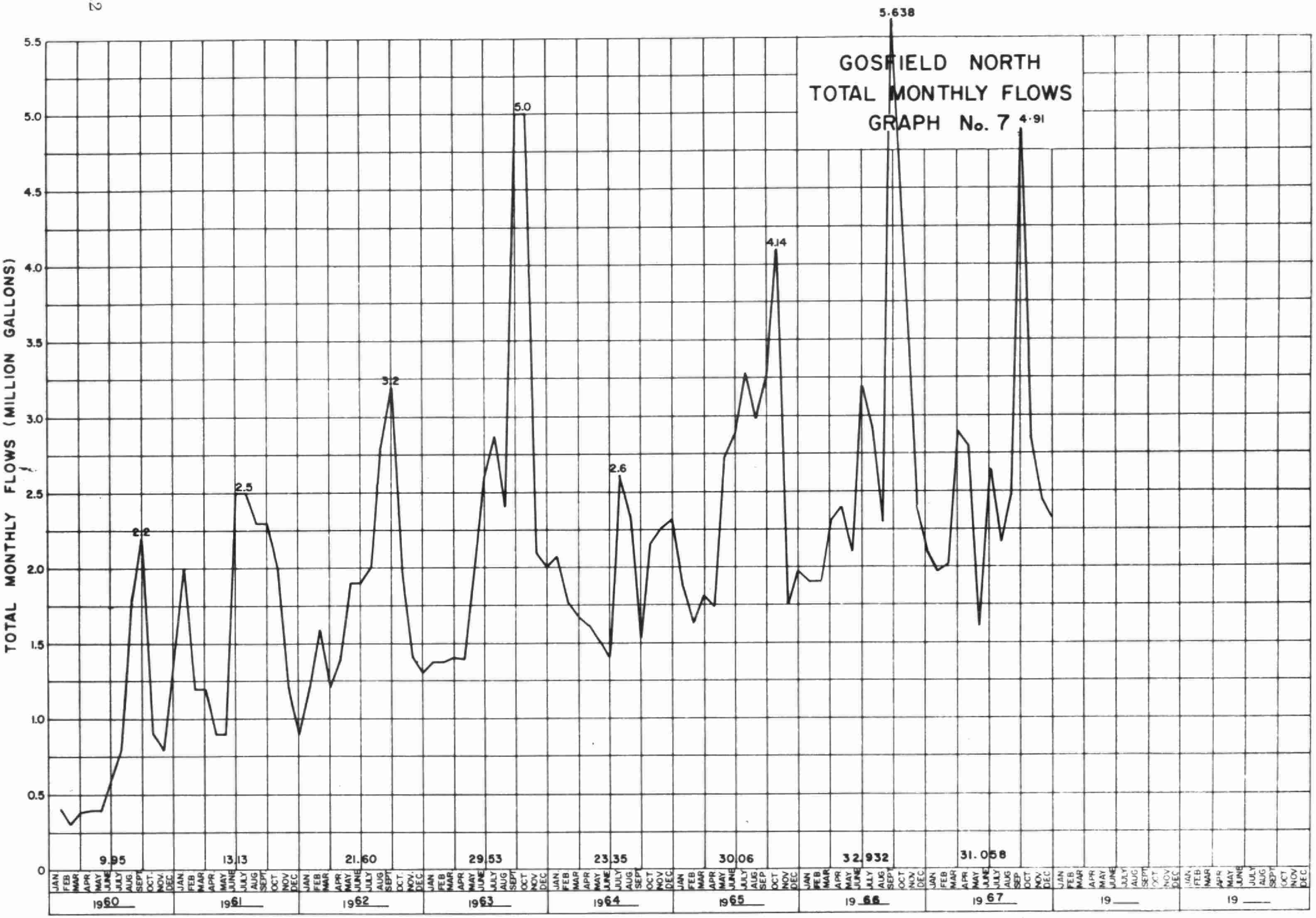


ESSEX
TOTAL MONTHLY FLOWS
GRAPH No. 4

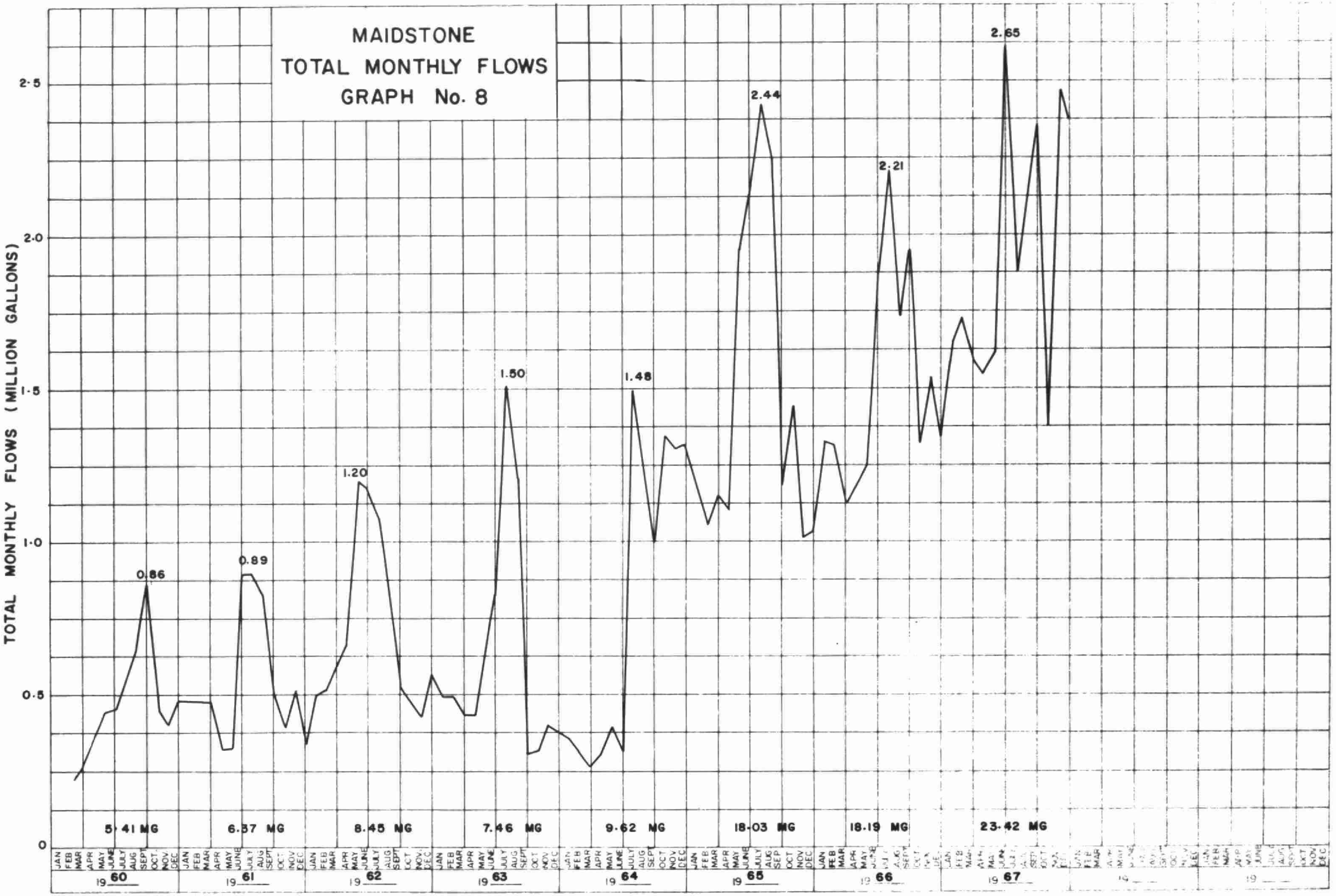

MERSEA
TOTAL MONTHLY FLOWS
GRAPH No. 5
TOTAL MONTHLY FLOWS (MILLION GALLONS)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0
9.0
16.0
25.0
25.0
20.9
25.7
23.4
27.7
55.70
79.85
99.51
137.71
127.96
168.68
158.530
165.231
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
1960
1961
1962
1963
1964
1965
19 66
19 67
19
19



GOSFIELD SOUTH
TOTAL MONTHLY FLOWS
GRAPH No. 6



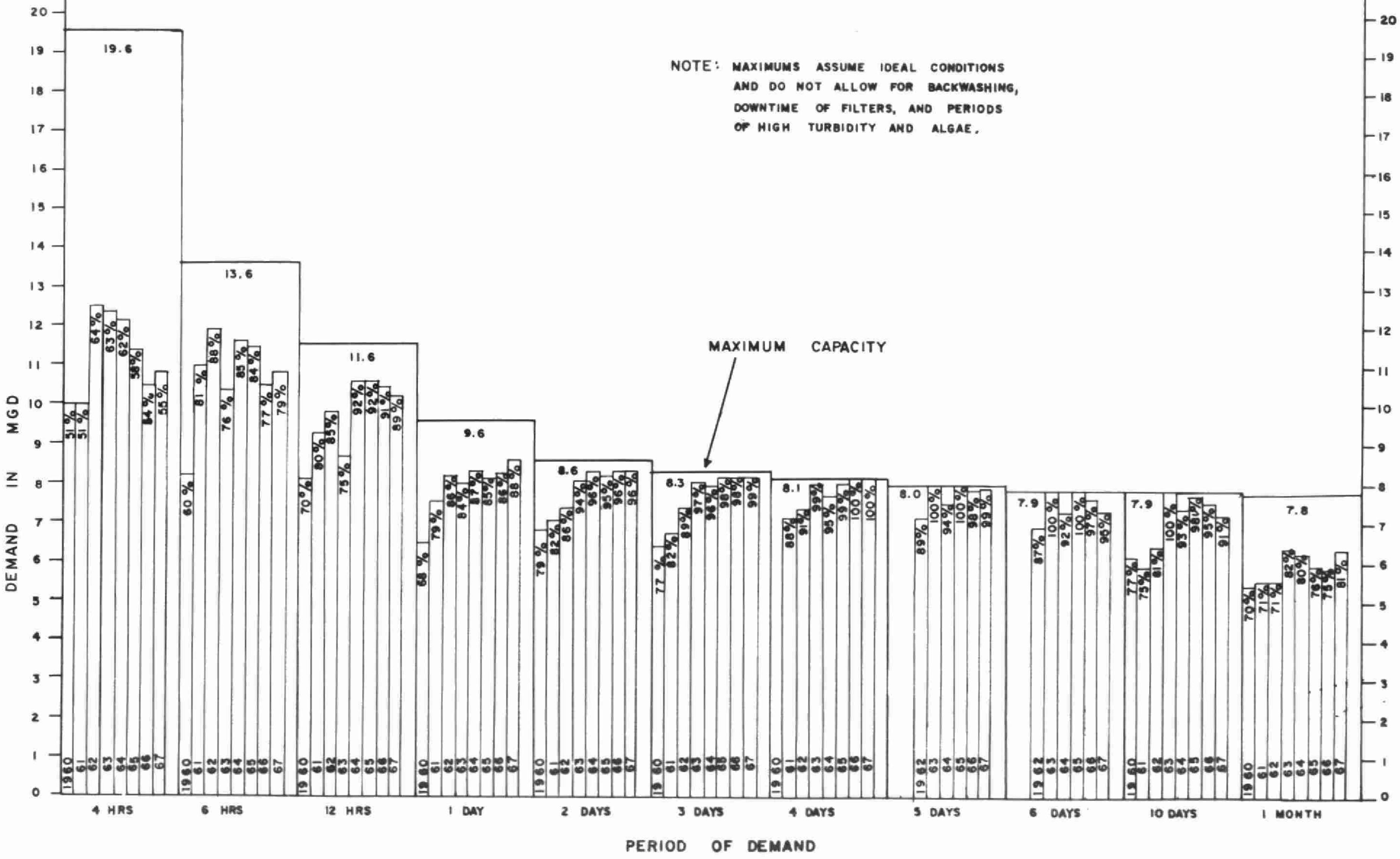
GOSFIELD NORTH
TOTAL MONTHLY FLOWS
GRAPH No. 7

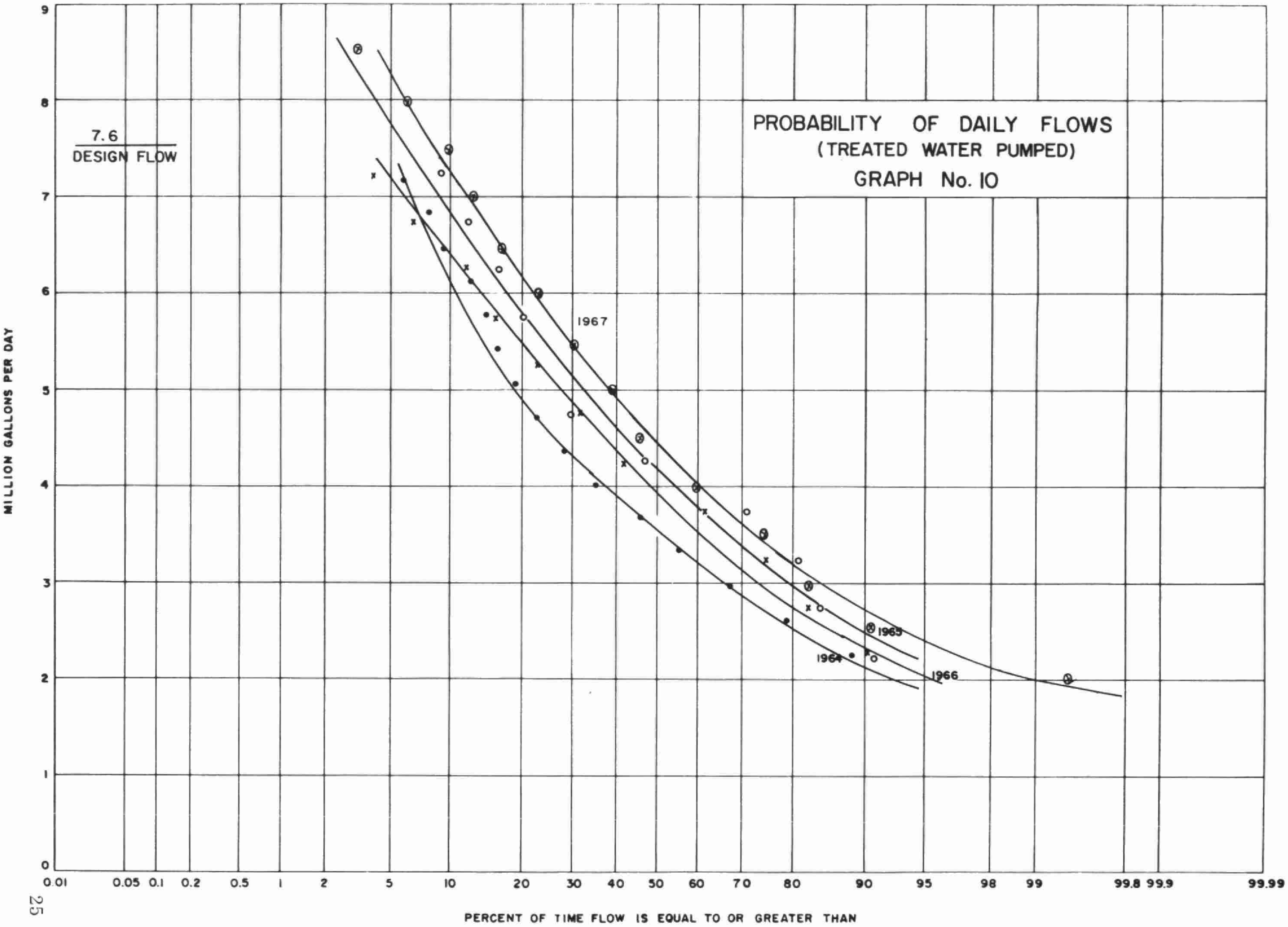

MAIDSTONE
TOTAL MONTHLY FLOWS
GRAPH No. 8
TOTAL MONTHLY FLOWS (MILLION GALLONS)
2·5
2·0
1·5
1·0
0·5
0
0.86
0.89
1.20
1.50
1.48
2.44
2.21
2.65
5·41 MG
6·37 MG
8·45 MG
7·46 MG
9·62 MG
18·03 MG
18·19 MG
23·42 MG
JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
OCT
NOV
DEC
19 60
19 61
19 62
19 63
19 64
19 65
19 66
19 67
19 __
19 __

PEAK DEMAND AS A PERCENTAGE OF DESIGN CAPACITY

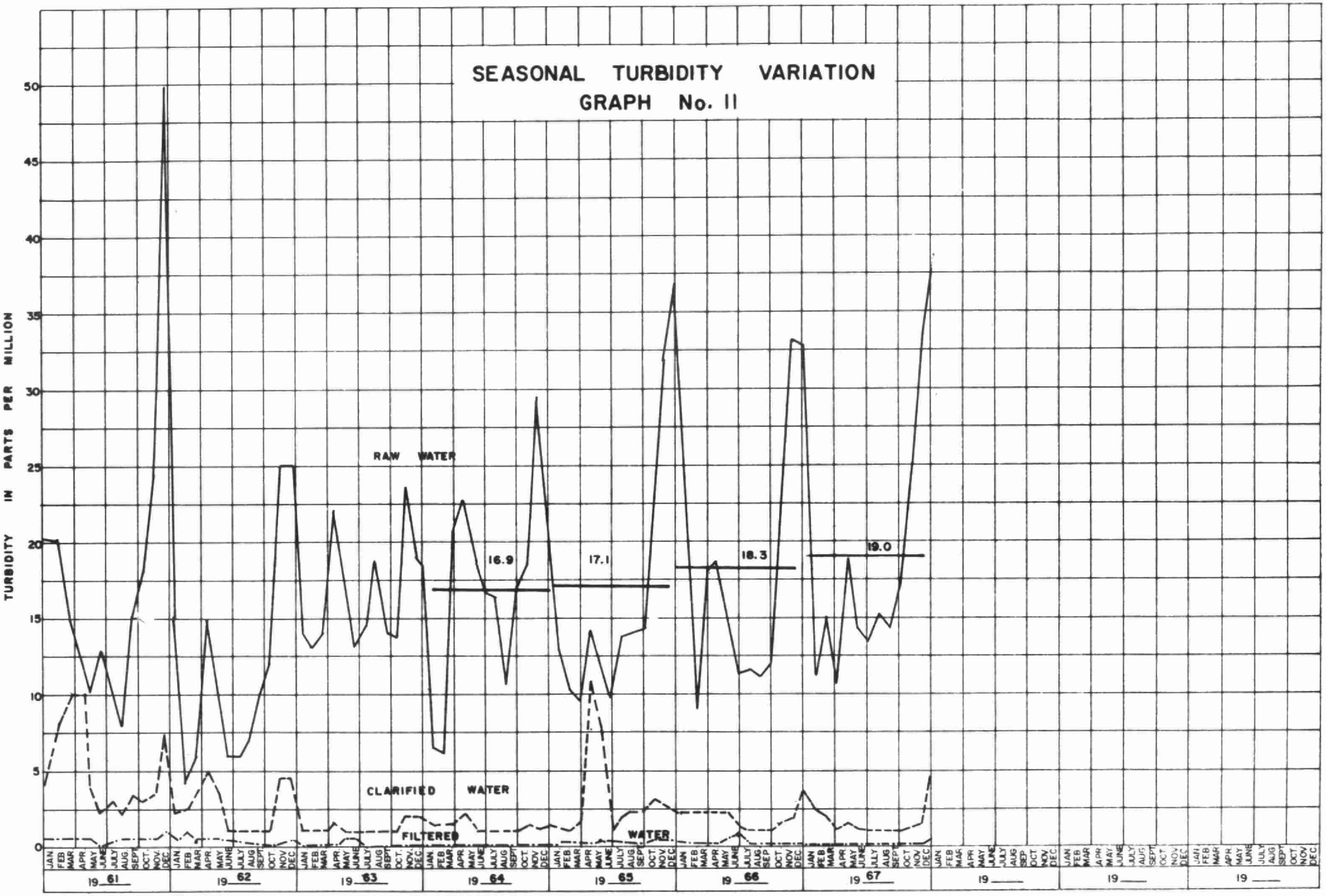
(BASED ON PLANT METER)

GRAPH No. 9





PROBABILITY OF DAILY FLOWS
(TREATED WATER PUMPED)
GRAPH No. 10



SEASONAL TURBIDITY VARIATION
GRAPH No. II

CHLORINATION

Month	PLANT FLOW (MG)	POUNDS CHLORINE		DOSAGE RATE (PPM)		TOTAL
		PRE	POST	PRE	POST	
January	81.036	968	327	1.19	.40	1295
February	80.763	1222	396	1.51	.49	1618
March	88.164	1240	410	1.40	.47	1650
April	92.442	1695	605	1.83	.65	2300
May	123.958	2628	887	2.12	.72	3515
June	171.302	4751	1584	2.77	.93	6335
July	167.335	5469	1986	3.27	1.19	7455
August	195.244	5274	1787	2.70	.92	7061
September	188.361	4731	1589	2.51	.84	6320
October	137.161	3049	1001	2.22	.73	4050
November	108.005	2245	740	2.08	.69	2985
December	99.465	1724	579	1.70	.56	2303
Total	1533.236	34996	11891	-	-	46887
Average	127.769	2916	991	2.11	.72	3907

COMMENTS

During 1967, an average dosage of 2.11 ppm of chlorine was used in prechlorination to maintain a residual of 0.15 ppm. An average dosage of 0.72 ppm of chlorine was used in post-chlorination to maintain a residual of 0.5 ppm in the treated water pumped to the distribution system. A total of 46,887 pounds of chlorine were used. This is an increase over consumption in 1966 due to the greater flows treated. There was a slight decrease in the chlorine demand from 1966 indicating a slight improvement in the quality of the raw water.

Date Due

LABORATORY LIBRARY
96936000119895

CONCLUSIONS

During 1967, the maximum demand equalled or exceeded 95% of the plant capacity over periods from two to six days. The total output increased by 5.5 percent and the peak month was 3.6 percent higher than in 1966. The plant load factor was 0.553 as compared to 0.554 in 1965 and 0.536 in 1966. The cost for production was 8.50 cents per 1000 gallons or 1.70 cents per ton as compared to 8.44 and 1.69 cents respectively in 1966.

Turbidities in the raw water followed much the same pattern in 1967 as in 1966. Slightly lower chlorine requirements indicate a slight improvement in the raw water quality.

ONTARIO WATER RESOURCES COMMISSION